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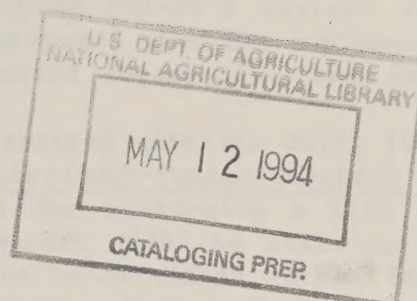
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AN IMPLEMENTATION PLAN FOR AR-SEA
FORAGE-LIVESTOCK RESEARCH
IN THE SOUTHERN REGION

FINAL DRAFT
SEP 26 1980



Report of a Special USDA-SEA
Agricultural Research Forage-
Livestock Workgroup,
Southern Region U S. A.

September, 1980

Foreword

The Southern Region, Science and Education Administration, Agricultural Research commends the Work Group for a job well done in preparing a comprehensive and thorough report identifying SEA-AR's current research program, researchable problems and a proposed plan for implementing future research needed to develop integrated forage-livestock management systems in the humid South.

Our intent is to use this report, supplemented with the July, 1978 report entitled "Recommended Adjustments in Livestock-Forage Research in the Southern Region", as a working document for developing a plan of action on forage-livestock initiatives in concert with the State Agricultural Experiment Stations, other interested Universities, other federal agencies, and private research organizations. Such a plan developed for the Southern Region must be an integral part of a national perspective. Thus, we dedicate this report, and any actions forthcoming after its publication, to the development of a comprehensive national plan for enhancing the productivity and quality of food, fiber and human endeavor resulting from the more effective and efficient use of our forage, livestock and other resources.

Robert F. Barnes

WORKGROUP MEMBERSHIP

Floyd P. Horn, Animal Nutritionist
Southwestern Livestock and Forage Research Station
USDA, SEA Agricultural Research
El Reno, OK (Chairman)

Joseph C. Burns, Plant Physiologist
Forage Research Group
USDA, SEA Agricultural Research
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Roger O. Drummond, Livestock Entomologist
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William E. Townsend, Food Technologist
Richard B. Russell Agricultural Research Center
USDA, SEA Agricultural Research
Athens, GA

Stanley R. Wilkinson, Soil Scientist
Southern Piedmont Conservation Research Center
USDA, SEA Agricultural Research
Watkinsville, GA

		1983 and 1984		
		1983	1984	1985
1	El Reno, OK	1.1	2.0	2.5
2	Wattsville, GA	2.2	—	2.7
3	Wattsville, GA	1.5	2.5	2.5
4	Wattsville, GA	—	2.5	2.5
5	Wattsville, GA	2.5	2.5	2.5
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Executive Summary

This "implementation plan" is developed for the purpose of establishing a strong forage-livestock research program within the USDA, SEA-Agricultural Research in the Southern Region of the United States. It is based on the July 19, 1978 report entitled "Recommended Adjustments in Livestock-Forage Research in the Southern Region". The proposed program depends heavily on the continued growth, integrity and viability of individual but related SEA-AR, state, private-foundation and industry programs.

Six physiographic areas are identified for emphasis. These areas roughly correspond to "Major Land Resource Areas" as described in the USDA Handbook 296 (Austin, Morris E., 1965 Land Resource Regions and Major Land Resource Areas of the United States. USDA-SCS, Washington, D.C). The areas identified are:

1. The Piedmont
2. The Hill Lands
3. The Coastal Plain
4. The Gulf Coast and Atlantic Coast Flatwoods
5. The Southern Great Plains and the Blackland Prairie
6. The Tropics

This implementation plan is intended to describe a comprehensive well coordinated research program for the Region, with emphasis on the needs of the humid southeast. Thus, in order of need, locations are identified in three climatic classifications: humid, sub-tropical/ tropical and sub-humid/semi-arid. The eleven "Principal" Locations identified and proposed SY increases for expanded forage-livestock research are:

Location	Major Land Resource Area	Proposed SY Increases		
		1983	1984	1985
<u>Humid:</u>				
1. Raleigh, NC	The Piedmont	2.7	2.0	0.9
2. Watkinsville, GA	The Piedmont	4.0	---	0.7
3. Booneville, AR	The Hill Lands	1.2	0.6	1.5
4. Hill Land Location	The Hill Lands	---	4.0	3.7
5. Tifton, GA	The Coastal Plain	2.0	2.0	1.0
6. Miss. State, MS	The Coastal Plain and The Blackland Prairie	---	4.0	2.5
<u>Sub-tropical/Tropical:</u>				
7. Brooksville, FL	The Gulf Coast and Atl- antic Coast Flatwoods	3.2	2.0	0.2
8. Mayaguez, PR	The Tropics	3.3	0.3	---
<u>Sub-humid/Semi-Arid:</u>				
9. El Reno, OK	The Southern Great Plains	1.8	1.0	---
10. Temple, TX	The Blackland Prairie	2.0	---	---
11. Kerrville, TX	The Southern Great Plains	3.0	1.0	---

These Locations are proposed to establish a network of research programs which can be coordinated to provide the array of seasonal, soil, climatic and management variables needed to provide basic information for the development of forage-livestock production technology, and for the validation of models to predict the interactions between soils, plants, animals and the environment.

The Report also contains a description of each Principal Location, current Mission Statements, forage-livestock researchable problems for Location emphasis and recommended changes in the research mission. The implementation plan describes staffing increases required for each Location to develop a strong forage-livestock program. Possibilities for coordination of programs between the Principal Locations and certain National/Regional Centers are identified.

Scope and Charge to the Workgroup

The Workgroup was established on December 27, 1979 by Dr. R. F. Barnes, Associate Regional Administrator, USDA, SEA-AR, Southern Region. The limited membership was intended to represent the major segments of the forage-livestock industry in which true integration of forage-livestock research efforts is necessary. One may refer to this integration as the "gray area" where the soil, plant and animal sciences overlap. The Workgroup was charged with developing a plan to implement a coordinated AR forage-livestock research program in the Southern Region. The plan was to be based upon and compatible with "Recommended Adjustments in Livestock-Forage Research in the Southern Region" published in July, 1978. Emphasis in the development of such a program was to be placed on the Southeastern United States; a separate research coordinating effort emphasizing arid and semi-arid areas of the Southwest was already underway. Inherent in the charge was the concept that any AR research program must be compatible and complimentary with other SEA-AR programs; SAES research and Extension activities and the related programs of other agencies and organizations operating in the Southern agricultural arena.

It is important to emphasize that this Workgroup was charged specifically to focus on the plant-animal interface. Because of the complexity of the dynamic components of this interface, it was left undefined but designated the "gray area". Subsequently, it was determined that research which focuses on the meshing of soil, plant and animal biological systems falls within the grey area. Research is considered within the "gray area" and is addressed in this Report if it involves forage that is grazed or stored and fed to livestock. Figure 1 illustrates what research falls within the "gray area". The soil, forage and animal factors have been generalized by the three composite circles. Research that involves forage-animal, soil-animal and soil-forage-animal interactions falls within the darkened areas shown in the composite circles and is within the "gray area"

Important independent factors specific to each of the three research areas of the composite circles are as follows:

<u>Soil Factors</u>	<u>Forage Factors</u>	<u>Animal Factors</u>
Fertility	Breeding	Breeding
Physical	Management	Management
Chemical	Insects	Ecto- and Endo-parasites
Microbial	Diseases	Diseases
Conservation	Weeds	Yield
	Yield	Growth
	Growth	Quality
	Quality	Reproduction
	Persistence	Behavior

Approach

The Workgroup first met in New Orleans, LA on March 11-12, 1980. After discussing the charge at length, it was decided that the format of the final report should provide all information thought necessary for development of a comprehensive package for consideration in the

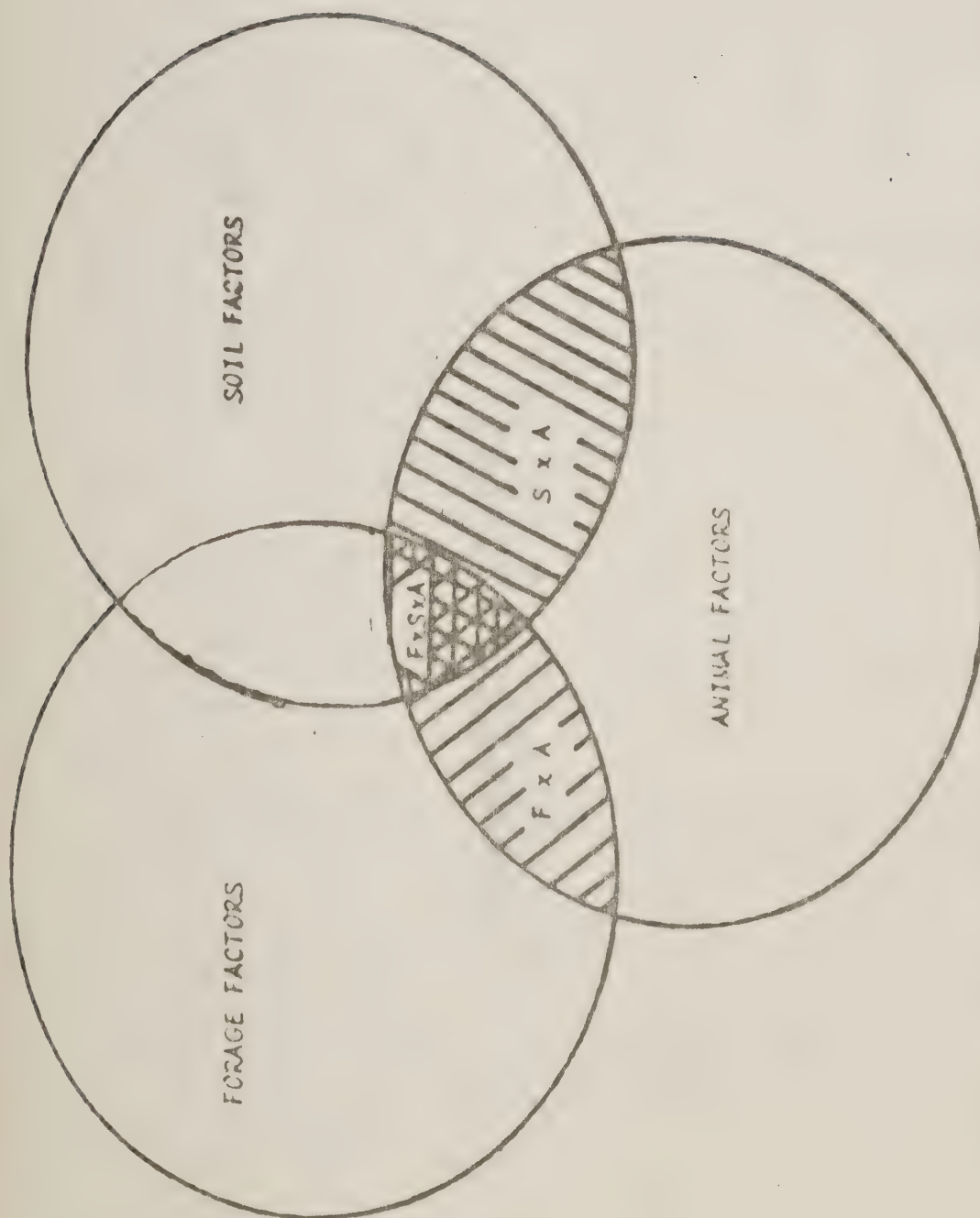


Figure 1. A representation of the interaction between soil, plant and animal science in Forage-Livestock Research. The shaded portions of the circle delineate the "gray" areas as defined in this report.

budgetary cycle. It was agreed that selected National Program Leaders, Technical Advisors, Program, Planning and Review Staff members and Area Directors should be involved in the evolution of even early drafts of the report. The first step was to review the base document, the Report of July, 1978 and discuss its recommendations in detail. Collection of data from which to evaluate the resource base at hand, programs in place and present plans, began immediately. Nineteen AR Locations in the Southern Region with activity in forage-livestock research were identified. All "in-house" and extramural CRIS project outlines from these Locations were reviewed in detail and those outlines indicating research activity at the plant-animal interface were reproduced and made available to all Workgroup members. In addition, all CY 1980 WRU reports and FY 1981 WRU Plans from these Locations were reproduced and made available to Workgroup members.

In order to maintain a keen awareness of correlated developments in Regional activities related to those of the Workgroup, members participated in several workshops and conferences. These included the Winrock Southern Forest Range and Pasture Resources Symposium, New Orleans, LA, March 13-14; the Conference on a Regional Modeling Project, Nashville, TN, May 22; and the Southern Regional Small Farms Workshop, New Orleans, LA, May 28-30.

The Workgroup met again in Atlanta, GA on June 2-3. The Report was outlined and the development of a "first draft" was begun. Distribution guidelines for it and subsequent drafts were established. The Workgroup met next in Atlanta, GA on June 23-24. The first draft was fully developed to the point where distribution for review by selected NPS, TAs, ADs and PPRs was initiated July 6.

Of twenty-nine technical experts asked to react to the first draft, twenty responded. The suggestions were constructive without exception, and they provided invaluable inputs for further evolution of the Report. The Workgroup met again in Atlanta, GA to incorporate the majority of these suggestions, on June 23-24. The result was a second draft.

The Southern Region Administrative Office, and in particular the Program Planning and Review Staff conducted an intensive evaluation of the second draft during July. Then, on August 13th the Workgroup Chairman, Dr. Floyd P. Horn, presented a status report to the Southern Region Area Directors in New Orleans, LA.

There was considerable discussion at the Area Directors meeting and again important contributions were to change the Report. Most important of all, however, the Area Directors recognized the need for a plan and without exception they offered to actively and aggressively work towards the goals established in the Report.

The Workgroup met in New Orleans, LA to finalize the Report on August 25-26, 1980.

Introduction

The Southern Region of the United States provides an abundance of forage and supports the majority of the Nation's livestock. Nevertheless, much of the forage-livestock resource is poorly managed and underutilized. Southern grasses are lower in quality than those found elsewhere and legumes are often hard to establish and even harder to maintain under grazing. Southern livestock have unique and often more severe reproductive and health problems than those found elsewhere, and the meat produced in the Region is frequently discriminated against in the market place. Deterrents to the production of high quality livestock and livestock products in the Southern Region can be neutralized by judicious allocation and coordination of research effort. This principle, along with carefully documented listing of "research needs" has been highlighted by scientists, land owners, conservationists and administrators time-and-time again during the decade of the 1970's.

The most recent such document entitled "Recommended Adjustments in Livestock-Forage Research in the Southern Region", was generated by an Ad Hoc Committee comprised of selected state and federal scientists working on forage-livestock research problems in the Region. Their report, published in July, 1978, was compiled under the auspices of, and endorsed simultaneously by, the Southern Agricultural Experiment Station Directors and the Southern Regional Area Directors of the USDA, SEA-AR.

Building upon the program recommendations outlined in the report of July, 1978, the present Report describes a plan for implementation of a coordinated forage-livestock research program within SEA-AR. But let there be no mistake, the proposed SEA-AR program depends heavily on the continued growth, integrity, and viability of individual but related state, private-foundation and industry programs. Implementation of such a program will augment, but not replace, efforts currently underway.

The Workgroup prioritized researchable problems most suitable for emphasis by federal research scientists. These problems were those of at least regional concern which could not normally be effectively studied within the boundaries of any particular state.

Rationale for a SEA-AR Southern Region Forage-Livestock Research Program

Results from forage-livestock research in the Southern Region have been difficult to evaluate, interpret and utilize. This can be attributed to the relatively narrow focus of the many individual and independent State research programs addressing specific state interests. This phenomenon has seriously hindered our ability to define and improve forage-livestock production systems for Major Land Resource Areas.

SEA-AR, as a federal agency with close state Agricultural Experiment Station ties, has the unique opportunity to provide coordination of such research across state lines. Such coordination would help bring complimentary research efforts into focus. It would facilitate the exchange of knowledge and scientific involvement in order to solve researchable problems of regional importance. It can strengthen the basic research effort in the Region by providing a wider array of land-

climate resources and livestock-genetic resources for study. Improved coordination would undoubtedly influence both state and federal research programs and likely result in less duplication of effort and use of more uniform methods.

Researchable Problems for SEA-AR Emphasis

1. Improve forage quality and quantity through introduction of pasture legumes; effective control of weeds and poisonous plants in pastures; more efficient cultural and management practices; and, better harvesting, storing and processing techniques.

2. Develop methods to rapidly and precisely predict the nutritional value of forages, especially warm-season perennials. Emphasize methods to assess the impact of quality improvement on digestibility and intake in grazing animals and measure voluntary intake by grazing animals.

3. Evaluate and neutralize animal disease, toxicological, parasitic and stress problems that reduce the efficiency of livestock production from forages. Include use of management practices, pesticides, drugs, and pest management technologies to prevent or reduce animal health problems to economical levels.

4. Define major interactions between animal genotype and production situations and discover the underlying causes for the interactions. Measure reproductive rate and efficiency of performance of offspring.

5. Develop potentially profitable and efficient systems of limited grain or high-forage finishing of cattle in confinement and/or pasture.

6. Define alternative and multiple land uses and predict results accruing from major land- and animal-use decisions. Devise the means of predicting returns on a per acre basis, as well as in terms of quantity or quality of product.

Physiographic Areas in the
Coordinated SEA-AR Forage-Livestock
Research Program

These physiographic areas roughly correspond to the Major Land Resource Areas in the Southern Region. Figure 2 illustrates the locations of these areas with respect to the Southern Region, and to Land Resource Regions as described by USDA Handbook 296. The Region extends from semi-arid conditions in the west to humid, warm conditions in the southeast. The physiographic areas as considered in this report are as follows: 1) The Piedmont, 2) The Hill Lands, 3) The Coastal Plains, 4) The Gulf Coast and Atlantic Coast Flatwoods, 5) The Southern Great Plains and the Blackland Prairies (Eastern and Western), and 6) The Tropics.

The physiographic areas have been characterized in a general way (table 1) with regard to climate, resources, soil problems which may relate to forage-livestock systems, and potential mineral related disorders in ruminants. In each physiographic area similar problems impede maximization of resource use efficiency in forage-livestock production.

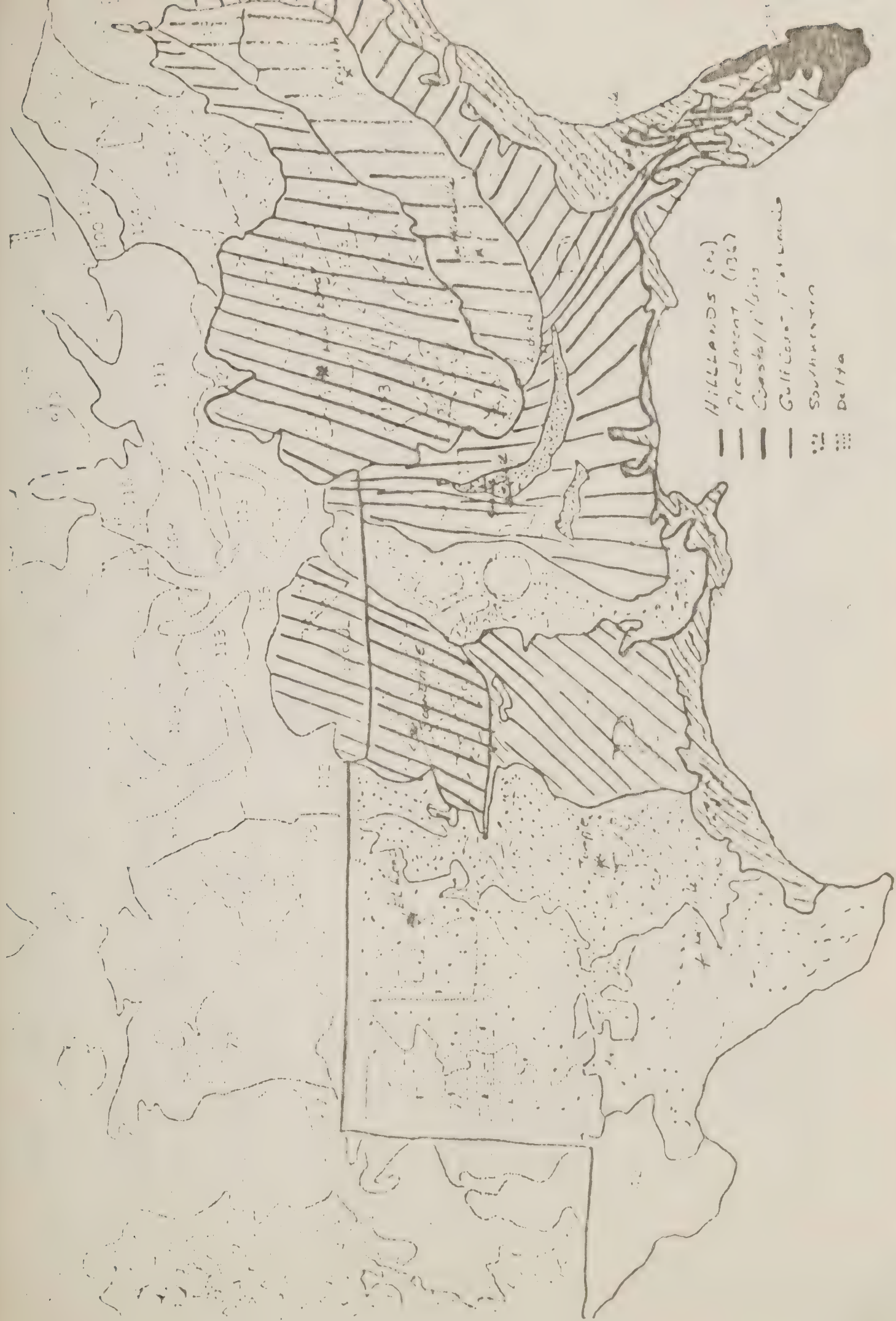


Table 1. Generalized Characterization of Physiographic Areas of Service in Relation to Coordinated Forage-Livestock Research, Southern Region, USDA, SEA-AR 1

Physiographic Area of Service

Parameter	Physiographic Area of Service				
Under Consideration	Piedmont	Hill Lands	Coastal Plains	Gulf and Atlantic Coast	Southern Great Plains
Resource Area (mi ²)	59,000	187,300	166,000	77,200	267,800
Rainfall (inches)	45-55	Climatic Resources			
Temperature (°F)	57-65	40-65	40-60	25-64	15-35
Freeze-free Period (days)	200-250	50-60	60-68	68-74	60-70
		150-220	200-280	270-320	190-260
Soil		Soil Resources			
Classification	Ultisols	Ultisols	Ultisols	Ultisols	Mollisols
		Alfisols	Entisols	Entisols	Alfisols
					Vertisols

Soil-Plant Problem Relative Ranking or Severity of Potential Soils Problems Which Affect Forage-Livestock System Productivity. (S = Severe; M = Moderate; R = Rare; N = None)

Soil Acidity	S ³	M	S	S	N
Nutrient Stress	M	M	S	S	R
Water Stress	M-S	M-S	S	M	S
Temperature Stress	M-S	M-S	S	M	S
Rooting Depth	R	R	M	M	R
Leaching	M	M	S	S with drainage	N
Potential Mineral Related Disorders ⁴	S	M-S	S	R poorly defined	R-S
Erosion Hazard	S-M	S	R	R	S-M

- The above represents generalization made for the purpose of characterization areas with respect to soils and their potential impact on grazing livestock and the environment.
- The area includes all of the physiographic provinces even though part of the province may lie outside the Southern Region. The data on area and climates description were adapted from Austin, Morris E., "Land Resource Regions and Major Land Resource Areas of the United States" Agriculture Handbook, 296 USDA, SCS, Dec. 1965, Washington, D.C.
- Soils problems which might relate to forage-livestock systems are relatively ranked as severe, moderate, rare or none and represent a qualitative judgement.
- Potential mineral related disorders in ruminant animals include grass tetany, wheat pasture poisoning, and the potential for micronutrient deficiencies in cattle fed forages only.

The "Principal" Locations

In order that forage-livestock research adequately serve the Region, "Principal" Locations were identified for development of strengthened programs. These locations were evaluated by several criteria: 1) there is or will be AR research in some phase of the forage-livestock spectrum, 2) there is or could be land available as necessary for forage-livestock research, 3) the geographic location is appropriate to represent an area of service selected for study, and 4) there is or could be strong cooperative programs with state scientists.

A. The Piedmont

1. Forage Research Group
Crop Science Department
North Carolina State Univ.
Raleigh, NC 27650

Forage Research Group
Tobacco Research Lab.
Route 2, Box 16G
Oxford, NC 27565

Description

The Raleigh Location supports an active, on-going SEA-AR program in forage-livestock research. Federal scientists at Raleigh are housed in the NCSU Crop Science Department. No federal land is available at Raleigh but the North Carolina Research Service lands, laboratories and support facilities provide a strong base of operation for the current program. Recently, SEA-AR and NCSU jointly funded the development of an Animal Metabolism complex consisting of a unit for forage evaluation, one for hay storage, one for studies of rumen function and one for studies of small ruminants. One SEA-AR scientist (J. C. Burns) currently conducts forage-livestock research on the NCSU campus.

The Oxford Location was recently assigned the task of improving white clover and alfalfa. The federal office-laboratory building has space available for expansion of the forage effort. It is located on 170 acres of state owned land. Small areas are suitable for grazing, but no comprehensive forage-livestock grazing research program could be established without additional land.

Official Program Mission Statement

Forage Research Group - Raleigh

The mission of the Forage Research Group at Raleigh, N.C. is (1) to elucidate plant constituents that alter dry matter intake and digestibility of forage, (2) to cooperate in the development of new forage types with favorable composition and (3) to evaluate forage-animal-environment relationships for forages and grazing systems and develop efficient management systems through grazing trials.

Forage Research Group - Oxford

The mission of the Forage Research Group at Oxford, N.C. is (1) to develop new and more complete genetic knowledge and theory for white clover and alfalfa and use this knowledge to breed adapted and pest resistant cultivars and germplasm populations (2) to breed white clover and alfalfa for multiple pest resistance, including pests of both forage producing and seed producing areas, (3) to investigate host-pathogen relationships for white clover and alfalfa, develop screening procedures needed to select for disease resistance and develop disease control methods.

Researchable Problems for Emphasis

Highest priority researchable problems compatible with the Raleigh-Oxford program include (1) development of innovative management practices that allow high calf or yearling gains ("grain-on-grass", creep grazing, early weaning, etc.); (2) development of year-round forage systems utilizing maximum grazing for the cow-calf enterprise; (3) evaluation of the quality, growth and persistence of new forages subjected to grazing; (4) determination of which plant factors alter forage intake and digestibility by grazing or stall-fed ruminants; (5) development of methods for determining forage utilization by ruminants and (6) development of mechanical methods for improving pasture, harvesting and storing forages for livestock feeding.

Recommended Changes in Mission

The mission statements of these two locations should express the close working relationships which currently exist, and should reflect the formation of a new Forage-Livestock Research Unit at Raleigh. This Unit could benefit from the strong cooperative relationships which exist between SEA-AR and the North Carolina Agricultural Experiment Station, and scientists could be housed within the appropriate NCSU Departments. However, Mission Statements should clearly delineate the nature of the forage-livestock interface research and provide the framework for formation of a cohesive team.

Recommended Staff Increase for Forage-Livestock Research Team (Raleigh only)

- 1.0 SY Animal Nutritionist (FY 1983 - Federal)
- 0.7 SY Biomathematician (FY 1983 - Federal)
(See Watkinsville, GA)
- 1.0 SY Weed Scientist (FY 1983 - Federal)
- 1.0 SY Field Agronomist (FY 1984 - Federal/State)
- 1.0 SY Plant Chemist (FY 1984 - Federal)
- 0.3 SY Veterinary Entomologist (FY 1985 - State preferred)
- 0.6 SY Agricultural Engineer (FY 1985 - Federal)
(See Watkinsville, GA)

2. Southern Piedmont Conservation Research Center
P.O. Box 555
Watkinsville, GA 30677

Description

The Watkinsville Location is comprised of 975 acres of federally owned land much of which is grassland. About 500 state-owned cattle graze significant portions of the pasture land now; cow-calf research is the predominant feature of the livestock research effort. Support laboratories in other disciplines at this Location and at the nearby Richard B. Russell Agricultural Research Center as well as the University of Georgia at Athens, GA are already cooperating. One AR Soil Scientist (S. R. Wilkinson), one AR Animal Nutritionist (J. A. Stuedemann) and one AR Agronomist (D. P. Belesky), are assigned to forage-livestock research now. In addition, one AR Parasitologist (H. Ciordia) located at Experiment, GA actively participates in the forage-livestock research effort.

Official Program Mission Statement

The Mission of the Forage-Livestock Research Unit of the Southern Piedmont Conservation Research Center is to do research which enhances efficient use of land and climatic resources in the production, and utilization of forages, pastures, and supplemental feeds by beef cattle. Research studies are directed toward: (1) the development of cow-calf and stocker grazing systems which optimize utilization of soil, climatic, plant, and animal resources within present and expected environmental and economic restraints, (2) the assessment of the effects of stresses associated with water deficits, nitrogen fertilization, and the effects of temperature on forage plant quality and utilization by beef animals, (3) the role of fertilizers and animal manures in efficient forage and beef production, (4) the effects of plant, soil, and climatic factors on the occurrence of animal health disorders such as grass tetany, nitrate poisoning, fescue toxicosis, etc., and the development of management techniques to prevent the occurrence of these animal health problems.

Researchable Problems for Emphasis

It is intended that this Location emphasize forage-livestock systems to effectively use the climatic, forage and soil resources associated with areas of land-use capability classes IV, V, and VI in the Southern Piedmont. These systems must integrate available resources into management packages which minimize the use of fossil fuels, and maximize fertilizer use efficiency and biological nitrogen fixation through legumes. The research should include the following: (1) development of integrated cowcalf/stocker

production systems; (2) development of forage production systems which incorporate improved soil and plant management and the use of improved plant germplasm; (3) evaluation of effects of pasture management practices on soil erosion and water quality; and (4) development of guidelines to predict soil limitations and assist in determining optimum land use.

Recommended Changes in Mission

None

Recommended Staff Increase for Forage-Livestock Research Team

- 1.0 SY Animal Nutritionist (FY 1983 - Federal)
- 1.0 SY Soil Microbiologist (FY 1983 - Federal/State)
- 1.0 SY Weed Scientist (FY 1983 - Federal)
- 1.0 SY Plant Chemist (FY 1983 - Federal)
- 0.3 SY Biomathematician (FY 1985 - Federal)
(Located at Raleigh, NC)
- 0.4 SY Agricultural Engineer (FY 1985 - Federal)
(Located at Raleigh, NC)

B. The Hill Lands

1. South Central Small Farms and Extension Center
Booneville, AR 72927

Description

The Booneville Location is comprised of 1500 acres of State owned land. Located in the Ouachita Mountains, the Center is probably capable of serving not only the "small farmers" in the immediate area, but also those in the Ozark Region to the north. The research program at this Location is in the formative stages but preliminary indications suggest a strong emphasis on forage-livestock research. There are no support facilities available at present, but an active building program is underway. The Director (a Research Entomologist) is the only scientist "on-board", but SEA-AR is actively recruiting one Research Agronomist and the University of Arkansas is recruiting one Research Animal Scientist.

Official Program Mission Statement

The Mission of the Center (initially) is to develop new knowledge on ruminant animals, forages, small fruits and vegetables; then incorporate this new knowledge with existing technologies, by using validation and system analysis research, into alternative systems of farming that can be used to improve the productivity and profitability of the small farmer within the highland region of the South Central United States.

Researchable Problems for Emphasis

This location, like some others, should emphasize the development of forage-livestock management systems with minimal inputs of fossil fuels and "off-farm" labor. Diversified agriculture should be a major theme of the program. A special effort should be made to incorporate not only beef cattle, but also sheep, goats and other livestock enterprises within the conceptual framework of a small-farm business. The systems developed should make maximum use of grazing, biological control of pests, principles of multiple land use and good conservation practices. Specifically, the research should include the following: (1) definition of genotype x environment interactions (GEI) of beef cattle (Booneville could make valuable contributions to the National GEI Project); (2) development of multiple livestock grazing systems; and (3) improved management of the Southern Forested Rangeland resource. The research should be designed to contribute in a major way to validation of forage-livestock and multiple land use models, and should yield results specifically tailored for small farms use, yet adaptable for broader application.

Recommended Changes in Mission

The mission of the Center should be developed further to reflect the strong relationship between research and extension efforts. In addition, it should reflect the establishment of a Forage-Livestock Research Unit with responsibility to identify, solve and control the problems of forage-livestock producers operating in a "small-farms" environment. Because small farms are common over much of the South, the mission should reflect the responsibility of the Center to the regional coordinated forage-livestock research effort.

Recommended Staff Increase for Forage-Livestock Research Team

- 1.0 SY Range Scientist (FY 1983 - Federal)
- 1.0 SY Animal Reprod. Physiol. (FY 1985 - Federal/State)
- 0.2 SY Veterinary Entomologist (FY 1983 - Federal)
(Located at Poteau, OK)
- 0.3 SY Animal Parasitologist (FY 1984 - State preferred)
(Located at Fayetteville, AR)
- 0.3 SY Soil Scientist (hydrology) (FY 1984 - State preferred)
(Located at Fayetteville, AR)
- 0.5 SY Biomathematician (FY 1985 - Federal/State)

2. Southern Appalachian Hill Land Research Station

Site to be determined

Description

The facility should be located in the hill lands of the Southern Appalachians, to address the unique problems of forage-livestock production in that area. Sufficient land for establishment of both "small-plots" and experimental pastures is essential, and facilities should be designed to accomodate not only cattle but also sheep and goats. Ultimately, on-site laboratories will be needed.

Program Mission Statement (Proposed)

The Mission of the Hill Land Station is to develop new technology to optimize the use of hill lands in livestock production systems while protecting the soil resource and enhancing the aesthetic quality of the land. The assignment includes (1) developing systems to optimize use of both natural and "improved" forage resources, (2) defining the lands most suitable for livestock production, (3) developing systems of multiple land use and defining principles of landuse decision making, and (4) solving the unique management problems of hill land farmers.

Researchable Problems for Emphasis

The major research effort at this location should initially focus on (1) development of guidelines to identify hill lands most suitable for livestock production systems consistent with good soil conservation practices; (2) development of systems to effectively utilize natural and improved forage resources in cleared or timber-covered areas; (3) development and evaluation of methods to establish and maintain high quality hill land pastures; and (4) development of principles for land use decision making.

Recommended Staff Increase for Forage-Livestock Research Team

1.0	SY	Animal Nutritionist (FY 1984 - Federal)
1.0	SY	Field Agronomist (FY 1984 - Federal)
1.0	SY	Soil Scientist (fertility) (FY 1984 - Federal)
1.0	SY	Agricultural Engineer (FY 1984 - Federal)
1.0	SY	Animal Reprod. Physiol. (FY 1985 - Federal/State)
1.0	SY	Plant Physiologist (FY 1985 - Federal/State)
1.0	SY	Soil Scientist (hydrol.) (FY 1985 - Federal/State)
0.3	SY	Animal Parasitologist (FY 1985 - Federal/State)
0.4	SY	Biomathematician (FY 1985 - Federal/State)

C. The Coastal Plains

1. Coastal Plains Experiment Station Tifton, GA 31794

Description

The Tifton Location is established on state owned land in the southeast portion of the Coastal Plains. Two research units conduct research related to forages: The Nematode and Weeds Research Unit has 1 PFT (N. A. Minton) assigned to nematode pathology, resistance and control in field and forage crops, and 2 PFT (E. W. Houser and C. C. Dowler) assigned to weed control in agronomic crops. The Forage and Turf Unit conducts forage crop breeding research in a strong multidisciplined program with 1 PFT (W. G. Monson) assigned to production and utilization of pastures and forage crops. Laboratory and support facilities are adequate.

Official Program Mission Statement

Nematode and Weed Research Unit

The mission of the Nematode and Weed Research Unit is to increase agricultural production efficiency in the Southeastern Coastal Plains by developing principles, practices, and systems for economic control of nematodes and weeds with maximum beneficial effects on yield and quality and minimum undesirable effects on the environment and public health. Devoted to this effort are a total of 6.0 SY (scientist) and 22.4 MY (support) including 14.5 MY contributed by the State of Georgia. One SY (Nicol) has recently been hired to conduct research on weed control in pastures.

Forage Turf Research Unit

The mission of the Forage and Turf Unit of the Southeastern Areas of Southern Region is (1) to develop new and improved breeding methods, genetic populations, breeding lines and cultivars of forage grasses and legumes that combine improved yield potential and forage quality with better resistance to pests, tolerance to environmental stress, conservation of scarce resources, and adaptation for small farm use as well as mechanized culture, harvesting and handling; (2) to develop new and improved management practices that increase forage crop yields, minimize production and utilization losses, improved feed quality, conserve and use scarce resources efficiently, and enhance environmental quality; (3) to develop new and improved cultural and management practices that increase forage crop and turfgrass seed yields, reduce production losses, and improve seed quality and preservation; (4) to develop turfgrass cultivars with increased pests resistance and tolerance to environmental stress; and (5) to develop improved cultural practices to reduce maintenance costs, provide greater persistence and improve aesthetic characteristics of turfgrasses.

Researchable Problems for Emphasis

It is recommended that the scope of the research activities at this location be expanded to permit increased evaluation of forage quality and beef production as it relates to the selection of improved plant genetic materials. This should include integration of new forages into efficient systems of limited-grain or forage finishing of beef on warm-season perennial grass pastures supplemented with cool-season annuals. Specifically the research should include the following: (1) development of pasture management systems to minimize the harmful effects of weeds; (2) development of production systems making maximum use of non-fossil fuel energy sources; (3) development of methods to control internal parasites in grazing livestock; and (4) development of high-forage finishing programs for beef cattle.

Recommended Changes in Mission

The mission statement should be changed to reflect the establishment of a new Forage-Livestock Research Unit. Emphasis would be placed on beef production from forages and research would be directed toward solutions of pasture establishment and production problems as well as animal nutrition and health problems, in the Coastal Plains.

Recommended Staff Increase for Forage-Livestock Research Team

- 1.0 SY Animal Nutritionist (FY 1983 - Federal/State)
- 1.0 SY Field Agronomist (FY 1983 - Federal/State)
- 1.0 SY Animal Parasitologist (FY 1984 - Federal)
- 1.0 SY Soil Scientist (hydrology) (FY 1984 - Federal)
- 1.0 SY Plant Physiologist (FY 1985 - Federal/State)

2. Forage Research Group

Agronomy Department
Mississippi State University
Mississippi State, MS 39762

Description

The Mississippi State Forage Research Group is located at Mississippi State University and is an integral part of the forage-livestock research effort in Mississippi. The forage unit is multidisciplinary consisting of one geneticist-plant breeder; one plant pathologist and one forage entomologist. No federal land is available for forage and animal research but state facilities have provided a strong base for operation of the present program. A contributing site in the coastal plain area of service is the South Mississippi Station (comprised of 815 acres). This site can provide a complement to the Tifton, GA location.

Official Program Mission Statement

The Mission of the Forage Research Unit of the Crop Science and Engineering Research Laboratory is to conduct host plant resistance studies on forage legume species. Initial research is designed to, 1) identify, characterize and determine the distribution of root-rot pathogens infesting forage legumes in the southeast, 2) elucidate the etiology of soil borne diseases of annual clovers and develop techniques for screening for resistance, 3) identify, characterize and determine the distribution of viruses infecting forage legumes in the southeast, 4) evaluate crimson clover inbred lines for resistance to the clover head weevil, Hypera meleus Fab., and refine screening techniques, 5) determine if the head weevil can be cultured and maintained in the laboratory, 6) determine the heritability of N₂ fixation in crimson clover Trifolium incarnatum L., 7) collect and evaluate new clover species and germplasm for adaptation to the southeast to provide a broad gene base and reduce genetic vulnerability to disease and insect pests, and 8) determine compatible combinations of improved grasses and legumes for maximum forage production with nitrogen supplied by the legume.

Researchable Problems for Emphasis

Areas for intensified research are: 1) evaluate, under grazing, the productivity of annual legume cultivars, as well as the persistence of both reseeding annual and perennial legumes, 2) develop technology to allow the seeding of legumes into warm season perennial pasture forages, 3) develop mechanical methods for improving pasture quality and productivity and for more efficient storage of harvested forages, 4) develop soil and plant management practices to improve animal production from natural and improved pasture, 5) develop and evaluate year-round forage grazing systems that provide adequate quality and quantity of forage for efficient meat production from cow-calf and stocker cattle enterprises.

Recommended Changes in Mission

The mission statement should be changed to reflect the establishment of a new Research Unit for forage-livestock research. Emphasis would be placed on beef production from forages and research would be directed toward solutions of pasture establishment and production as well as animal nutrition and health problems in the mid-south. This unit could benefit from the strong cooperative relationships which exist between SEA-AR and the Mississippi Agricultural and Forestry Experiment Station and the availability of land resources and facilities.

Recommended Staff Increases for Forage-Livestock Research Team

- 1.0 SY Field Agronomist (FY 1984 - Federal)
- 1.0 SY Animal Nutritionist (FY 1984 - Federal)
- 0.5 SY Weed Scientist (FY 1985 - State preferred)
- 1.0 SY Soil Scientist (microbiology) (FY 1984 - Federal/State)
- 1.0 SY Agricultural Engineer (FY 1985 - State preferred)
- 1.0 SY Plant Physiologist (FY 1985 - State preferred)
- 1.0 SY Biomathematician (FY 1984 - State preferred)

D. The Gulf Coast and Atlantic Coast Flatwoods:

- 1. Brooksville Beef Cattle Research Station
P. O. Box 246
Brooksville, FL 33512

Description

The Brooksville Location is comprised of 4,000 acres of which 3,500 is improved pasture. The station is located on the South Central Florida Ridge and, for that reason, is not representative of much of the Southern Region. Nevertheless, the federally owned land resource offers considerable potential for research to establish principles of forage utilization and it is the only SEA-AR station in the contiguous 48 states offering the opportunity to conduct research with tropical forages. Genotype x environment interaction (GEI) studies, of extreme importance in the beef industry, can derive unique contributions from the Brooksville site. There are no laboratory facilities "on-site" now, but Gainesville is within 100 miles and interim laboratories could presumably be provided. The Location Leader (W. C. Burns) with a background in animal breeding, and a recently appointed Category III Animal Husbandman (Adams) make up the on-site scientific staff. Both have minor responsibilities in support of forage-livestock research initiated by University of Florida scientists. The Research Leader (W. T. Butts) located at Knoxville, TN, is an Animal Geneticist with extensive experience in genotype x environment interaction research.

Official Program Mission Statement

The primary Mission of the Brooksville Beef Cattle Research Station continues to be animal breeding with special emphasis on (1) studying responses of different genotypes to different environments, (2) investigating the backcross principle utilizing the traits of reproduction and calf survival in Brahman cattle as specific objective of the study, (3) investigating the relationship between cow size and efficiency of production in beef cattle and (4) measuring variation among Herford heifers in voluntary intake of low energy feed and relating intake to subsequent performance as cows.

Researchable Problems for Emphasis

The Brooksville Station can provide unique opportunities to observe the effects of a sub-tropical environment on both forage plants and livestock. It is recommended that emphasis at this Location be placed on improving the quality of subtropical forages and cow reproductive performance. Specifically the research should include: (1) quantification of beef cattle genotype x environment interactions with emphasis on the nutritional "environment"; (2) development of forage-livestock management systems to increase beef reproductive efficiency; (3) development of herd-health programs to reduce the impact of parasites and disease on performance; and (4) identification of mineral nutrition problems and development of corrective measures.

Recommended Changes in the Mission

The mission statement should be changed to reflect the establishment of a new Forage-Livestock Research Unit. The emphasis on GEI in beef cattle should be identified as the framework on which the remainder of the program is built. Close ties with the program at Mayaguez, PR should be established and documented in the mission statement. This Station's responsibilities to the coastal areas extending to the north and west should be described.

Recommended Staff Increase for Forage-Livestock Research Team

1.0	SY	Animal Nutritionist (FY 1983 - Federal)
1.0	SY	Field Agronomist (FY 1983 - Federal)
1.0	SY	Animal Geneticist (FY 1983 - Federal/State)
1.0	SY	Animal Reprod. Physiol. (FY 1984 - Federal/State)
1.0	SY	Soil Scientist (fertility) (FY 1984 - Federal)
0.2	SY	Animal Parasitologist (FY 1983 - State preferred)
0.2	SY	Veterinary Entomologist (FY 1986 - State preferred)

E.

The Tropics;

1. Mayaguez Institue of Tropical Agriculture

USDA, SEA-AR
P.O. Box 70
Mayaguez, PR 00708

Description

The Mayaguez Location is comprised of 290 acres of federally owned land. Most of the area is intensively managed and unsuitable for the establishment of pastures. However, at the Isabela worksite nearby, there is considerable potential for livestock-forage research. The Isabela worksite is comprised of 125 acres of federally owned land much of which is or could be grazed. University of Puerto Rico lands at Isabela might also be developed for cooperative forage-livestock research. Both Mayaguez and Isabela are close to the University research units at Fortuna which are in part allocated to the dairy and beef research programs.

Official Program Mission Statement

The Mission of the Mayaguez Institute of Tropical Agriculture is (1) to aid continental U.S. agriculture through winter nurseries that permit year round outdoor experiment and development, (2) to introduce, evaluate, select, multiply, preserve, and develop tropical crop germplasm of interest to the U.S., (3) to aid the agriculture of Puerto Rico by carefully selected cooperative studies, and (4) to contribute to the development of agriculture in the tropics through Section 406 and other tropical research support programs.

Researchable Problems for Emphasis

Mayaguez offers the only opportunity to extend results from the Regional forage-livestock research program to the tropics. This Location should coordinate its activities with those of other Principal Locations in the Region. It is especially important that the Mayaguez program be closely tied to that at Brooksville, FL. Specifically the research at Mayaguez should include: (1) development of multiple livestock grazing systems; (2) development of technology to control weeds in tropical pastures; (3) development of methods to control livestock parasites; and (4) methods to improve the reproductive performance of ruminant animals.

Recommended Changes in Mission

The mission statement should be modified to reflect the establishment of a Forage-Livestock Research Unit. It should reflect the dual role of the Mayaguez Location as the Nation's representative to a tropical environment and as an important component in the developing agriculture of Puerto Rico.

Recommended Staff Increase for Forage-Livestock Research Team:

1.0	SY	Animal Nutritionist (FY 1983 - Federal)
1.0	SY	Field Agronomist (FY 1983 - Federal)
1.0	SY	Animal Parasitologist (FY 1983 - Federal)
0.3	SY	Biomathematician (FY 1983 - Federal/State)
0.3	SY	Veterinary Entomologist (FY 1984 - Federal/State)

F. The Southern Great Plains and the Blackland Prairies

1. The Southwestern Livestock and Forage Research Station

USDA, SEA-AR
Route 3
El Reno, OK 73036

Description

The Southwestern Livestock and Forage Research Station is comprised of 6,800 acres of grassland in the Southern Great Plains. Approximately 1,200 cattle and 500 sheep, owned by the

Oklahoma Agricultural Experiment Station, are involved in the current research program. A team of 4 scientists has been assembled at El Reno to conduct research at the forage-livestock interface. Two AR Animal Nutritionists (F. P. Horn and S. W. Coleman), one AR Agronomist (U. G. Bokhari) and one AR Soil Scientist (W. E. Lonkerd) make up this team. SEA-AR has recently begun construction of a modern research/production feedmill, and a new large-animal digestion/metabolism barn was recently completed. In addition, there are plans to expand office and laboratory space to accommodate additional staff.

Official Program Mission Statement:

The Mission of the Forage-Beef Cattle Research Unit at the Southwestern Livestock and Forage Research Station is (1) development of new technology to optimize the production of high-quality beef from forages and crop residues; (2) reduction of losses of beef calves from stress related respiratory disease; (3) development of principles of forage production and utilization and livestock management; (4) development of superior forages for livestock production; (5) quantification of biological responses related to production of beef from forages and crop residues, and (6) quantification of effects of changing land use on soil fertility, nutrient loss and runoff water quality.

Researchable Problems for Emphasis:

Much of the research conducted at the El Reno Location involves livestock production systems based on warm-season perennial grass species; grasses which have demonstrated productive potential across most of the Southern Region. Also this Location has recently initiated research on "calf production alternatives" and "genotype x environment interaction". Future research should include: (1) development of methods to incorporate dry-land legumes in warm-season perennial grass pastures; (2) development of multiple livestock species/multiple forage species grazing systems; (3) utilization of forage- and grain-crop residues; and (4) and development of methods to control weeds and livestock pests on range and in pastures.

Recommended Changes in Mission

None

Recommended Staff Increase for Forage-Livestock Research Team:

1.0	SY	Animal Reprod. Physiol. (FY 1983 - Federal)
1.0	SY	Animal Nutritionist (FY 1984 - Federal)
0.5	SY	Soil Scientists (fertility) (FY 1983 - Federal)
0.3	SY	Biomathematician (FY 1983 - Federal/State)

2. Grassland, Soil and Water Research Laboratory

P.O. Box 748

Temple, TX 76501

Description

The Temple Location is comprised of 540 acres of federally owned land, about half of which is suitable for grazing. In addition, Temple maintains as a "worksite", the Riesel, TX Watershed; an 840 acre unit all of which is suitable for grazing. The station is located in the Texas Blackland Prairie; a resource area which Temple could adequately represent in the forage-livestock research program. Laboratory and support facilities at Temple are excellent and the location has strong contributing programs in plant breeding and genetics, and in soils.

Official Program Mission Statement

The Mission of this laboratory is to develop technology for maximizing forage and crop production; revegetating depleted, brush-infested watersheds; controlling noneconomic brush and weeds; breeding forages with increased quality and yield potential; and solving problems relating to soil and water management, soil fertility, erosion, hydrology, and water quality. The mission is achieved through the research activities of a multidisciplinary staff of scientists and engineers organized into four Research Units.

Researchable Problems for Emphasis

The major focus of the research effort will initially be to (1) develop minimum-management schemes that effect efficient forage utilization consistent with low energy and low labor inputs and conservation practices; (2) evaluate year round production systems with maximum grazing for the cow-calf enterprise; and (3) evaluate the quality, growth and persistence of newly developed forage cultivars when subjected to grazing.

Recommended Changes in Mission

The mission statement should be revised to reflect the addition of the new primary objectives to the program. Care should be taken to highlight the role of the Temple forage-livestock program in the coordinated Regional program. The plant-animal interface work should, on the one hand, expand the scope of the already strong plant breeding effort but on the other hand, be established as a discreet entity capable of interacting freely with other ForageLivestock Research Units. A special effort should be made to identify the forage-livestock program with the special needs of the Blackland Prairie soils of the Region. The mission should also identify the important role which Temple will play in the recently initiated National GEI Project.

Recommended Staff Increase for Forage-Livestock Research Team

- 1.0 SY Animal Nutritionist (FY 1983 - Federal/State)
- 1.0 SY Field Agronomist (FY 1983 - Federal/State)

3. U.S. Livestock Insects Laboratory

USDA, SEA-AR
P.O. Box 232
Kerrville, TX 78028

Description

The U. S. Livestock Insects Laboratory at Kerrville is located on 33 acres of Federally owned land. However, it has a long-term lease on 7800 acres of Department of Defense-owned land at Camp Stanley and Camp Bullis, TX, about 40 miles away. This land receives about 30 inches of rain a year and is used for grazing of the about 200 cattle owned by the laboratory. Presently the cattle are used for testing insecticides, raising ticks and flies, and for studies on biology, life history, and ecology of arthropods affecting livestock. The Laboratory has strong programs in livestock entomology aspects of animal health. Such programs would lend strong support to the anticipated forage-livestock research program.

Official Program Mission Statement

Research at the U. S. Livestock Insects Laboratory is conducted in three Research Units:

(1) The Mission of the Biting Fly and Cattle Grub Research Unit is to (1) find new animal protectant sprays and animal systemic insecticides; (2) develop pathogens and host resistance mechanisms for control of livestock pests; (3) study the biology, ecology, dispersion, and migration of biting flies to prepare for pests management control systems; and (4) develop equipment and techniques to enhance activity of and decrease hazards of insecticides for livestock. (S. E. Kunz, Research Leader)

(2) The Mission of the Scabies and Mange Mite Research Unit is to (1) find new acaricides for control of Psoroptes ovis of cattle; (2) study the life history, biology and relationship of scabies mite to hosts; and (3) develop specific immunological tests to determine scabies infestations of livestock. (W. P. Meleney, Research Leader).

(3) The Mission of the Tick Research Unit is to (1) find new acaricides and other agents for tick control; (2) study life history, ecology and seasonal dynamics of ticks of livestock; and (3) discover genetic, cytogenetic, biochemical, and immunological mechanisms for tick control. The Tick Research Unit conducts work at Poteau, OK, on biology, control, ecology, and management

of lone star ticks; and at Falcon Heights, TX, on biology, ecology, and control of cattle ticks in support of an APHIS eradication program. (J. E. George, Research Leader)

Researchable Problems for Emphasis

The addition of a Range Livestock Nutritionist to the staff will allow the research on the effect of arthropod pests on grazing cattle. Specifically the research should include: (1) measurement of growth and reproduction of grazing cattle of several breeds (and crosses) in response to presence or absence of specific arthropod pests, (2) effects of livestock genotype on populations of arthropods, and (3) arthropod x beef genotype interactions. The addition of a Veterinary Physiologist (Immunologist) would allow for specific research on the effect of veterinary arthropods on cattle. Specific research projects would be (1) measurement of physiological and immunological reactions of livestock to arthropods, (2) detection and creation of resistance in cattle to arthropods, and (3) development of integrated pest management techniques in which resistance in livestock would be used as a control mechanism. The addition of Animal Parasitologist would allow an assessment of the anthelmintic activities of chemicals currently being screened for insect control activity. Of specific emphasis will be genotype-environment interaction studies under the field conditions at Camp Stanley and Camp Bullis with a focus on parasitic arthropods as a major factor of the environment.

Recommended Changes in Mission

The Official Mission Statement should be revised to reflect the addition of animal scientists to the Kerrville staff. This expertise has long been needed to fully utilize the beef cattle owned by this laboratory. Special emphasis should be placed on the role of the Kerrville Laboratory in genotype-environment interaction studies with beef cattle. In addition, the anticipated studies on the effect of arthropod pests on the physiology and immunology of cattle need to be highlighted.

Recommended Staff Increase for Forage-Livestock Research Team:

- 1.0 SY Range Livestock Nutritionist (FY 1983 - Federal)
- 1.0 SY Veterinary Physiologist (Immunologist) (FY 1983 - Federal)
- 1.0 SY Animal Parasitologist (FY 1983 - Federal)
- 1.0 SY Veterinary Entomologist (FY 1984 - Federal)

G. Summary of Proposed SY Increases

The SY's recommended for each Principal Locations by discipline and National Research Program (NRP) are shown in table 2. Also designated are proposed dates for addition of these scientists, the proportion of their time which will be required and recommendations as to whether they should be federal scientist, state scientists or if they could be either.

of lone star ticks; and at Falcon Heights, TX, on biology, ecology, and control of cattle ticks in support of an APHIS eradication program. (J. E. George, Research Leader)

Researchable Problems for Emphasis

The addition of a Range Livestock Nutritionist to the staff will allow the research on the effect of arthropod pests on grazing cattle. Specifically the research should include: (1) measurement of growth and reproduction of grazing cattle of several breeds (and crosses) in response to presence or absence of specific arthropod pests, (2) effects of livestock genotype on populations of arthropods, and (3) arthropod x beef genotype interactions. The addition of a Veterinary Physiologist (Immunologist) would allow for specific research on the effect of veterinary arthropods on cattle. Specific research projects would be (1) measurement of physiological and immunological reactions of livestock to arthropods, (2) detection and creation of resistance in cattle to arthropods, and (3) development of integrated pest management techniques in which resistance in livestock would be used as a control mechanism. The addition of Animal Parasitologist would allow an assessment of the anthelmintic activities of chemicals currently being screened for insect control activity. Of specific emphasis will be genotype-environment interaction studies under the field conditions at Camp Stanley and Camp Bullis with a focus on parasitic arthropods as a major factor of the environment.

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Recommended Staff Increase for Forage-Livestock Research Team:

- 1.0 SY Range Livestock Nutritionist (FY 1983 - Federal)
- 1.0 SY Veterinary Physiologist (Immunologist) (FY 1983 - Federal)
- 1.0 SY Animal Parasitologist (FY 1983 - Federal)
- 1.0 SY Veterinary Entomologist (FY 1984 - Federal)

Proposed "SY" Additions to "Principal" Locations in the Southern Regional Forage-Livestock Research Program.

Discipline	NRP	"Principal" Locations										Sub-trop/Trop				Sub-humid/Semi-arid			
		Humid										Brooks ville FL				El Reno OK			
		Raleigh -Oxford NC	Watkins ville GA	Boone- ville AR	Hill Land	Tifton GA	Miss. State MS	Brooks ville FL	Maya- guez PR	El Reno OK	Temple TX	Kerr- ville TX							
Plant Chemist	20100	1.0 FY 84	1.0 FY 83		1.0 FY 84	1.0 FY 83	1.0 FY 84	1.0 FY 83	1.0 FY 83										
Field Agronomist	20100	1.0 FY 84																	
Range Scientist	20100			1.0 FY 83															
Plant Physiologist	20170				1.0 FY 85	1.0 FY 85	1.0 FY 85												
Agricultural Engineer	20190	0.6 FY 85	0.4 FY 85		1.0 FY 84		1.0 FY 85												
Weed Scientist	20280	1.0 FY 83	1.0 FY 83				0.5 FY 85												
Animal Geneticist	20360																		
Bio-mathematician	20360	0.7 FY 83	0.3 FY 85	0.5 FY 85	0.4 FY 85		1.0 FY 84		0.3 FY 83	0.3 FY 83									
Animal Reprod. Physiologist	20360			1.0 FY 85	1.0 FY 85			1.0 FY 84											
Range Livestock Nutritionist	20360																		
Animal Nutritionist	20360	1.0 FY 83	1.0 FY 83		1.0 FY 84	1.0 FY 83	1.0 FY 84	1.0 FY 83	1.0 FY 83	1.0 FY 84	1.0 FY 83								
Animal Parasitologist	20420				0.3 FY 85	1.0 FY 84		0.2 FY 83	1.0 FY 83										
Veterinary Entomologist	20480	0.3 FY 85		0.2 FY 83					0.3 FY 84										
Veterinary Physiologist	20480																		
Soil Scientist Hydrology	20760			0.3 FY 84	1.0 FY 85	1.0 FY 84													
Soil Scientist Fertility	20780				1.0 FY 84														
Soil Scientist Microbiology	20780		1.0 FY 83				1.0 FY 84												

Federal

Federal/State

State preferred

The Role of the National/Regional Centers in
the Regional AR Forage-Livestock Research Program

U.S. Livestock Insects Laboratory, Kerrville, TX

The variety and magnitude of the external pests in each physiographic area of the Southern Region is a factor which must be considered in the evaluation of the growth and well-being of livestock in any comprehensive forage-livestock research effort.

In addition to being a potential "Principal" location for forage-livestock research, the U.S. Livestock Insects Laboratory at Kerrville, TX has expertise needed to interact with forage-livestock research teams at several locations. The laboratory can provide specific inputs to determine the effects of external pests (flies, ticks, lice, etc.) on the growth and health of the livestock in the range-pasture environment. Kerrville scientists can evaluate the variety and abundance of these pests, provide methods to measure their population in the field and develop techniques for their control. Interactions such as those described can probably best be accomplished through regular "on-site" visits and participation by members of the Kerrville staff who are interested in host-pest interaction. Interactions can also be accomplished by use of Specific-Type Cooperative Agreements with State Departments of Entomology near appropriate forage-livestock locations, to provide local veterinary entomology expertise to the animal scientists on the forage-livestock research team.

Richard B. Russell Agricultural Research Center (RRC), Athens, GA

The unique climate of the region with its mild winters, and hot, humid summers permits high annual primary pasture productivity through use of a wide variety of cool and warm season species. Many of these species have not been adequately characterized from a physical and chemical point of view. Warm season grasses are considered to be of low digestibility, and when consumed have low intake characteristics. Active research concerning physical and chemical characterization of these species with regard to ruminant livestock energy and nutrient requirements is conducted in the Field Crops Research Unit Athens, GA. Research is also conducted on methodology effects of harvesting and storing forages, and their consequent digestible energy content and consumption. The basic research in predicting and measuring forage quality at the RRC represents a knowledge and expertise base which can be useful to grazing research studies in all physiographic areas. This is especially true as scientists determine the capacity of forages to meet nutrient requirements of grazing ruminants, and in evaluating the effects of defoliation-by-grazing on plant growth and composition. The expertise at the RRC should be sought out by locations conducting grazing research so that the experimental forages produced can be fully characterized. Piedmont and Coastal Plains physiographic areas appear to have especially high potential for mutual benefit from coordination of field grazing research, the basic laboratory research conducted at RRC on the structure and composition of Southern forages, and on the effects of production systems on meat quality, composition and acceptability.

National Dairy-Forage Research Center, Madison, Wisconsin

The newly created Dairy-Forage Research Center has as its broad charge the evaluation of forages relative to their potential role in dairy rations.

Because of the Center's national mission and the problems associated with the quality of Southern forages, especially perennial grasses, active cooperation must occur between appropriate staff at this facility and scientists in the Southern Region. Cooperation may take the form of exchange-of-material and information among scientists, or more appropriately, the funding ("inhouse" or extramural) of mutually agreed upon areas of research in the Southern Region. Such cooperation will help complete the intended mission of the National Center and provide basic data that will be directly applicable to the development of new dairy technology in the Southern Region. Most promising SR sites for effective cooperative relationships to develop include the Forage Dairy Research Station, Lewisburg, TN; the University of Tennessee, Knoxville, TN, and North Carolina State University, Raleigh, NC. These sites presently have active forage-dairy programs.

The Northeast Regional Pasture Laboratory, University Park, Pa.

The staff and facilities at the Regional Pasture Laboratory offer expertise in the area of pasture improvement, cultivar development and forage quality evaluation through infra-red analysis.

Although some cooperation has existed between the Pasture Laboratory and scientists in the Southern Region, appreciably more seems warranted because of mutual benefits. The major thrust of cooperation lies in the area of infra-red analysis of forages. The pasture laboratory has taken the lead role in coordinating a national network of some six locations to further characterize and evaluate the use of infra-red reflectance technology for predicting forage quality. They have also provided training and "software" adjustments in this effort.

The involvement of scientists from the Pasture Laboratory "on-site" at appropriate locations in the Southern Region would provide them the opportunity to more fully achieve their Mission relative to the grazing situation. Cooperation may occur in all those areas indicated above, i.e. pasture improvement, cultivar development and infra-red evaluation.

Cooperation in the area of improving pastures might be fostered in the livestock-forage research programs at Knoxville (including Lewisburg) TN; Lexington, KY; and Booneville, AR where such expertise is, in general, lacking. Alternatively, selected cultivars developed at the Pasture Laboratory can become an integral part of forage evaluation programs at such locations as Lexington, KY; Raleigh, NC; Watkinsville, GA; Temple, TX; and El Reno, OK. The infra-red effort appears well developed and should be encouraged as long as mutual benefits are derived.

Veterinary Toxicology and Entomology Laboratory (VTERL),
College Station, TX

The AR expertise on the effect of poisonous plants and man made toxicants such as pesticides, veterinary products or agricultural chemicals located in the Veterinary Toxicology Research Unit of VTERL may be called upon to evaluate the effect that these chemicals may have on the growth and well-being of livestock in forage-livestock research. These factors may have a sporadic appearance and a transient, limited effect, but if they are not recognized, evaluated and mitigated, they may affect the final outcome of specific forage-livestock research. The additional research on biological control agents such as dung beetles which can reduce the population of manure breeding flies, improve aeration, and increase fertility of soils by their dung burying activities is also part of the Mission of the Biological Control Research Unit of VTERL. Personnel in this unit should be aware of opportunities to evaluate in the field at various locations the effect that the release and establishment of a variety of dung beetles would have on both the growth and well-being of livestock and the improvement of forages. Such evaluation could be a part of forage-livestock research.

Northcentral Regional Research Center (NRRC), Peoria, Illinois

The expertise in the area of natural plant chemistry and the location of the Peoria laboratory adjacent to a major tall fescue producing area, has resulted in the involvement of several chemists from the laboratory in understanding the causes and mechanisms involved in tall-fescue toxicosis. Such involvement illustrates the potential for other significant contributions to field-oriented forage production programs in the Southern Region. This contribution has been critical at locations where researchers experience tall fescue toxicity, but have no expertise to examine the causal relationships.

Cooperation between NRRC and Southern Region SEA-AR scientists has already occurred at the Russell Research Center, Athens, GA and at the University of Kentucky, Lexington, KY. Opportunities for additional cooperation between NRRC scientists and those at each of the designated "Principal" Forage-Livestock research centers should be explored on a continuing basis and as problems of mutual interest arise. Ideally, the need can be resolved through short-time involvement. Nevertheless, such an arrangement would challenge the scientists at the Regional Laboratory with a problem of economic importance to which he could apply his expertise and help eliminate an important deterrent to efficient animal production in the region.

U.S. Plant, Soil and Nutrition Laboratory, Ithaca, NY

Soils of the humid south are highly weathered, acid and low in both exchange capacity and percentage base saturation (Calcium and Magnesium). Fertilization is essential to land productivity in both improved and unimproved pasture management systems.

There is a continuing need to emphasize balanced fertilization practices. Quality of Southern forages is notoriously low, and mineral nutrition of plants and livestock may be a problem in specific areas. The U.S. Soil, Plant and Nutrition Laboratory conducts basic research on plant, soil and nutrition problems. There have been several mineral related problems documented in the Southern Region and specific cooperation is underway presently. These common areas of research interest have included hypomagnesemic grass tetany in the Southern Piedmont, Coastal Plain, Hill Lands; and Wheat Pasture Poisoning in the Southern Plains. Selenium deficiency has been known to occur in the Hill Lands region and it may occur in the Piedmont. The "Flatwoods" and Gulf Coast physiographic area soils are relatively low in available micronutrients. Therefore, in these areas it is important to monitor grazing ruminant performance and health on pasture and relate findings to the basic research done at the Plant, Soil and Nutrition Laboratory. Grazing research programs in these physiographic areas may provide opportunities for "dovetailing" results of basic and applied research for the benefit of beef producers of the region.

National Animal Disease Center (NADC), Ames, Iowa and
Haemoprotozoan Diseases Laboratory, Beltsville, MD

Although these laboratories are located outside the Southern Region, they contain personnel with expertise in the variety of diseases, both infectious and non-infectious, that affect the growth, wellbeing and reproduction of livestock in the Southern Region. The individual responsible for "animal health" on each forage-livestock research team in the Southern Region should also be responsible for determining the need for, creating the mutually beneficial atmosphere for and providing for the utilization of the expertise of these laboratories as it relates to the forage-livestock research effort.

Arthropod-borne disease such as anaplasmosis, and other infectious and non-infectious diseases must be considered as a specific limiting factor that affects livestock and should be evaluated. Considerations of the presence, treatments and elimination (if possible) of these diseases should be undertaken via regular consultation with personnel of NADC and the Haemoprotozoan Disease Laboratory.

Regional Parasite Research Laboratory at Auburn, AL and
Cattle Parasite Research Laboratory at Experiment, GA

The only AR research in biology and control of internal parasites of livestock in the Southern Region is conducted by personnel located at Experiment, GA and Auburn, AL. This expertise on the biology and control of these parasites and their affect on the growth and wellbeing of livestock must have an input into the planning and execution of forage-livestock research in the Southern Region. This input can be in the form of the presence, for brief periods, of research personnel from these laboratories "on-site" at the Forage-Livestock Research sites. Alternatively, these scientists can manage Specific Type Cooperative Agreements with State Veterinary Schools or Departments of Parasitology thereby providing parasitology expertise to the forage-livestock research teams at appropriate locations. Dr. Ciordia from

Experiment, GA, already participates in the grazing research underway at Watkinsville, GA. Such factors as the variety and numbers of internal parasites, the effects of infectious, non-infectious, and parasitic diseases, and the effects and value of control of parasites and diseases must be considered an integral part of the environment of the livestock in forage-livestock research.

Beltsville Agricultural Research Center, Beltsville, MD

The Beltsville Agricultural Research Center (BARC) is a major center in the U.S. where expertise, facilities, equipment and supporting staff are conducting research on most major phases of forage production and utilization.

The mission in forage research is very broad, and over sixteen disciplines are conducting forage-related research. In forage production efficiency, the work involves germplasm development, physiological and morphological factors contributing to yield and quality of forages, and soil plant relationships involving mineral uptake. Forage utilization includes conservation and utilization of high and low quality forages by dairy and beef cattle. Utilization of forage by livestock includes research on silage preservation, effect of heating, protein and energy value of forages and basic digestive-physiological factors influencing efficient use of forage by ruminants.

Beltsville is currently cooperating with the Forage Dairy Research Station, Lewisburg, TN, and has cooperated with various other locations in the Southern Region. Due to the broad interest and the fundamental nature of the research at Beltsville, a great potential exists for cooperation of BARC scientists with scientists in the Southern Region. Beltsville is one of six cooperators to characterize and evaluate the use of infra-red reflectance instrumentation for determining forage quality.

Roman L. Hruska U.S. Meat Animal Research Center, (MARC) Clay Center, NB

Research conducted at the MARC focuses on developing new technology for the meat animal industry to increase production of high quality red meat. Facilities permit a conception-to-consumption research program with beef cattle, sheep and swine. Production systems and modeling teams interact to determine the usefulness of research findings to industry and to determine new research areas needing attention.

The complete feed supply for beef cattle and sheep is raised on Center land and this offers a unique opportunity to grow and test various forages, cereal grains, crop residues, etc., in ruminant experiments. With the diverse biological base of beef cattle (20 breeds) and sheep (9 breeds), this offers a unique opportunity to study the soil-plant-animal complex. Furthermore, the Center lies on the transition zone for the growth of cool- and warm-season grasses with irrigation potential.

The recent opening of the meats laboratory permits detailed basic and applied research in the meats area. Focus will be on production factors (breeding, nutrition, environment, etc.) affecting quality and quantity of end product. Forage-fed and bull-fed beef will be large

projects, as will growth engineering and lipid and enzyme studies on meat. Storage, processing and consumer acceptance will also be evaluated.

Center personnel are heavily involved in leading and being a part of coordinated national research efforts in animal breeding, genetic-environmental interaction, climate and other studies with meat animals. An agricultural engineering unit offers a unique opportunity to study harvesting and handling of forages as well as other aspects of animal production. Direct involvement of MARC personnel in efforts such as these is feasible at most if not all "principal" locations in the Southern Region. Such involvement would clearly strengthen the nations forage-livestock research effort.

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